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Social Capital and Health: A Longitudinal Analysis from the British Household Panel Survey

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Abstract: We investigate the impact of social capital on mental and physical health in the UK. Data from the British Household Panel Survey were obtained on individual-level social capital (social participation, friends contact, and social support) and health status (perceived mental and physical health). Our analysis suggests that permanent friend contact is positively (negatively) associated with mental (physical) health whilst social support is positively associated with both mental and physical health. We also find that initial health status exerts a greater bearing on subsequent health outcomes than previous health status and that there are systematic differences in health mobility across socio-economic groups. We conclude that that short-term social support reduces the probability of recovery from mental or physical illness and that long-term friend contact and social support are important determinants of mental and physical health.

Key Words: mental health, self-reported health, social capital, structural factor, longitudinal analysis
JEL Classification: J33, J41, J54.

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1. Introduction

A growing recognition of the social determinants of health suggests that social capital contributes to health inequalities both within and between populations (Henderson & Whiteford, 2003). Generally, the research suggests that higher levels of social capital can enhance an individual's sense of self-efficacy and mastery, reduce alienation and stress and ultimately contribute to a sense of well-being, thus improving health (Morrow, 1999). There is also a consensus that social capital is important in encouraging a physically active lifestyle (Booth et al.; Giles-Corti & Donovan; Greiner et al.; Leyden). As well, a number of studies have suggested that personal ties, contacts and mutual support enhances an individual's access to information, resources and opportunities and can make available assistance and emotional support, thus meeting physical and mental health needs (Nakhaie & Arnold, 2010). Policy makers have adopted the importance of social capital and made change in health policy. For instance, the UK Department of Health has explicitly cited developing social capital as an important feature of health promotion (Health, 2001, 2006, 2010).

Whilst international studies based on longitudinal data has generally supported a causal relationship from social capital to health (Drukker et al., 2003; Kawachi et al., 1996; Orthgomer et al., 1993; Welin et al., 1992), the overwhelming majority of British studies are compromised by their reliance on cross-sectional data. This obfuscates the relationship between health outcomes and social capital and renders any attempt to identify causality impossible. For example, a recent systematic review of 50 studies into the association between structural social capital (group participation) and common mental disorders highlighted the frailties of the research conducted to date:

> A particularly serious limitation is the predominance of cross sectional studies, which makes the direction of association between social capital and mental illness impossible to determine. It is highly plausible that mental illness could result in low social capital. (De Silva et al., 2005).

Longitudinal analysis is clearly required to unravel the more nuanced possibilities regarding the relationship between social capital and health within the UK, and to illuminate any inter-temporal persistence of health issues across different socio-economic groups. In particular, there is a pressing need to inform the debate concerning the veracity of claims that building social capital is an important facet of national health policy in the UK.

In what follows we endeavour to unravel the causal relationship between both mental and physical health and three indicators of social capital – participation in local organisations, friend and contact and social support, utilising data from the British Household Panel Survey. These three individual social capital indicators are by definition endogenously determined and depend on individual specificities. We tackle this endogeneity problem using random effects variance component models.

The paper is set out as follows: Section 2 describes our data in detail whilst Section 3 discuses our estimation and modelling. Our results are presented in Section 4 and final comments are collected in Section 5.

2. Data – The British Household Panel Survey

Our data are derived from the British Household Panel Survey (BHPS) from September 1991 through September 2007. The BHPS is a nationally representative panel survey of the British population on a micro-social level following a sample of approximately 5500 households and over 10000 individual respondents annually since 1991. As such, the BHPS satisfies the basic requirement of providing data on individual units as opposed to aggregates, and in being highly disaggregated in terms of detail.

To ensure comparability over our sample period, we constructed a balanced panel in which information on all the required variables was reported at each wave and

in which observations were limited to respondents who answered questions in each wave. As the social capital indicators used in our study are not measured at every wave of the BHPS, we imputed data from the previous wave. For example, social participation was recorded in waves 1-5, 7, 9, 11, 13, 15 and 17 and so data from wave 5 were imputed to wave 6, wave 7, to wave 8, and so on accordingly. Pevalin and Rose (2002) compared this method of imputation to a number of others and concluded that the particular methods made little or no difference to the final results mainly because the scale was collapsed into a dichotomous indicator.

Measures of perceived mental health

We use the responses to the General Health Questionnaire (GHQ), which was originally developed as a screening instrument for psychiatric illness but is often used as an indicator of subjective well-being. The main advantage of the GHQ is that it does not require a subjective assessment by a specialised clinician. The BHPS uses a 12-item version of the GHQ based on answers to questions on concentration, sleep loss due to worry, perception of role, capability in decision making, whether constantly under strain, perception of problems in overcoming difficulties, enjoyment of day-to-day activities, ability to face problems, loss of confidence, self-worth, general happiness and whether suffering depression. It is usually self-administered and is based on the respondent's assessment of their present state relative to their usual/normal state (see Bowling, 1991; Goldberg & Williams, 1988). The respondent is asked to indicate on a four-point ordinal scale how they have recently felt with respect to the item in question. The GHQ items were coded to create a scale from 0 to 12 and we follow Goldberg et al., (1998a) in employing a threshold score of 4+ to create a dichotomous indicator of 'common mental illness' (CMI) such that the respondent is recorded as *mentally unhealthy* if CMI = 1 and *mentally healthy* if CMI = 0. The predictive and content

validity of the GHQ are good in comparison to other well-known scaling tests of mental illness (Bowling, 1991). The GHQ in the BHPS also performs well in reliability tests (Bowling, 1991) and has been shown to be robust to retest effect making it a suitable longitudinal instrument (Pevalin, 2000).

Measures of perceived physical health

We use a single 5-point Likert-type scale item to measure perceived physical health status. Previous studies have shown this measure to be one of the best predictors of healthcare utilisation, costs and mortality (Bierman et al., 1999; Davies & E., 1981; Fylkesnes & Forde, 1991; Mossey & Shapiro, 1982). Respondents are asked about their overall health and the response categories are: excellent, good, fair, poor, and very poor. These categories are collapsed into a dichotomous indicator of self-rated health (PHL) by combining the 'poor' and 'very poor' responses such that the respondent is recorded as *physically unhealthy* if PHL = 1; *physically healthy* if PHL = 0.

Measures of social capital

Previous research has generally maintained that social capital is fundamentally multi-dimensional with disputed contradictable definitions at both theoretical and empirical levels (Cooper et al., 1999). The issue of the validity of currently available quantitative measures is keenly disputable (Coulthard et al., 2001). The BHPS does however offer some reasonable proxies for certain dimensions of social capital (see Pevalin & Rose, 2002) and some of these are set out in Table 1.

Social participation

Social participation is commonly referred to as a behavioural/activity component of social capital and individual social capital is commonly measured by asking individuals about their participation in social relationships and organisations (Bain & Hicks, 1998;

Lindstrom et al., 2001; Lindstrom et al., 2002). It is apparent from Figure 1 that more than 35 per cent of our panel report themselves as not being active in any of the organisations listed in Table 1. Note that the maximum number of organisations was truncated at six or more because of the very low numbers of respondents reporting above six.

Table 1: Scoring of Social Capital Question

Question item	*Response/scoring*
Social Participation	
Member of political party *---------- trade union* *---------- environmental group* *---------- parents association* *---------- tenants or residents group* *---------- religious group* *---------- voluntary service group* *---------- other community group* *---------- social group* *---------- sports club* *---------- women's institute* *---------- women's group* *---------- other organisation* *---------- professional organisation* *---------- pensioners organisation* *---------- scout/guides organisation*	*No = 0* *Yes = 1*
Friends	
How often do you see or get in touch with your 1st/2nd/3rd closest friend either by visiting, writing or by telephone	*Less often = 1; At least once a month = 2; At least once a week = 3; Most days = 4*
Social Support	
Is there someone who will listen? *Is there someone to help in a crisis?* *Is there someone you can relax with?* *Anyone who really appreciates you?* *Anyone you can count on to offer comfort*	*No one = 0; Yes, one person = 1; Yes, more than one person = 2*

Frequency of contact with three closest friends

The frequency of contact with friends is often considered as bonding social capital (Brisson & Usher, 2007; Derose, 2008; Lowndes, 2004). In waves 2, 4, 6, 8, 10, 12, 14, and 16, respondents were asked about how regularly they were in touch with their three closest friends. The responses were constructed into an additive scale used as an overall

index of contact with friends (see Figure 2). The scale ranged from 1 to 12 and had an internal reliability coefficient (Cronbach's alpha) of 0.94.

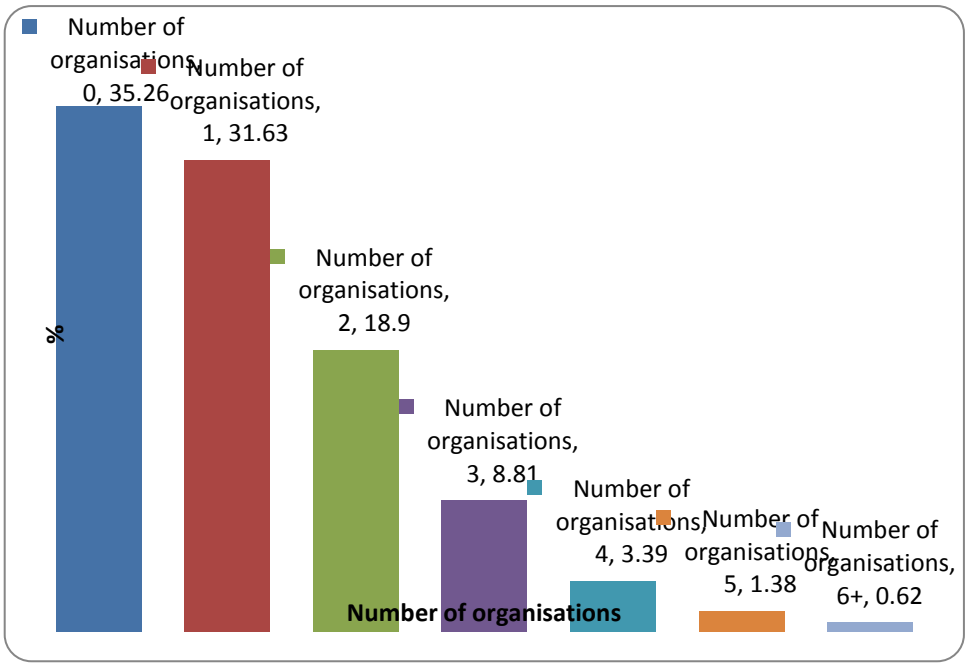

Figure 1: Distribution of Social Participation

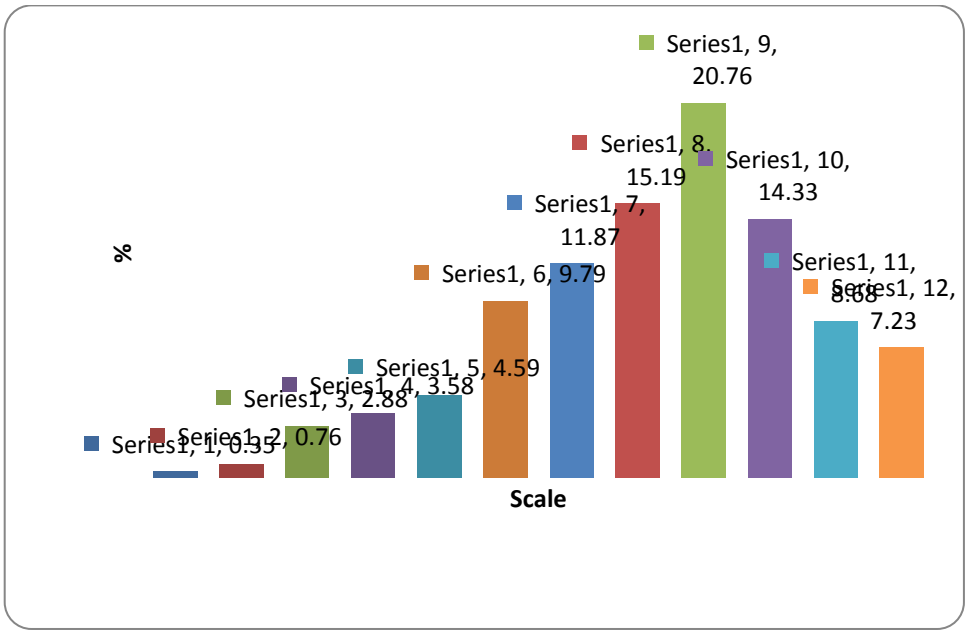

Figure 2: Distribution of Contact with Friends' index

Social support

Five questions designed to measure social support were included in waves 1, 3, 5, 7, 9, 11, 13, 15, and 17. The responses were combined to make an additive scale ranging from 0 to 10 with an internal reliability coefficient was 0.89. The distribution was negatively skewed (see Figure 3). In addition, we created a dichotomous variable to indicate those at the cut-off score of six or below which corresponded with the lowest quartile of the respondents overall.

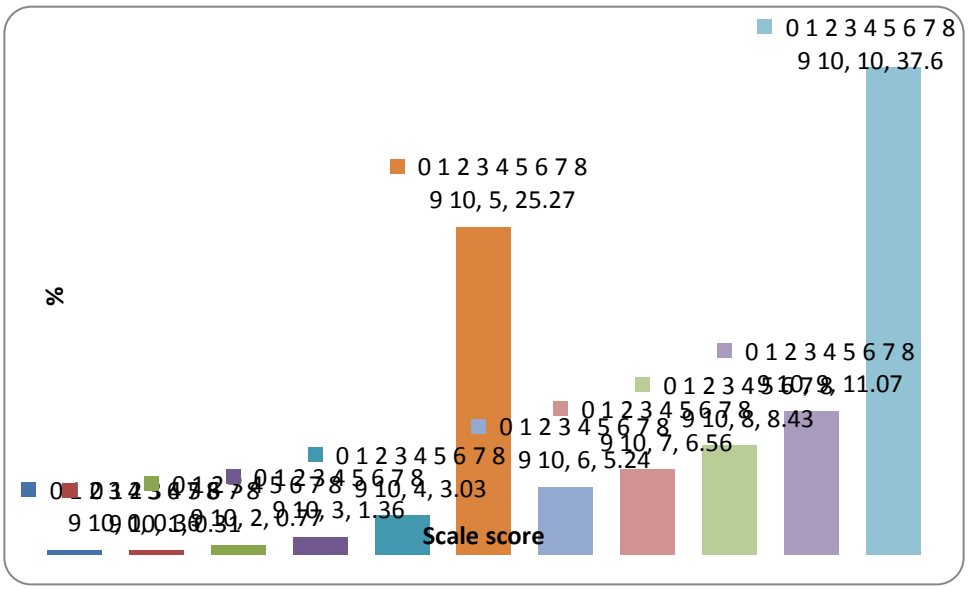

Figure 3: Distribution of social support scale

Structural factors

We used six structural and demographic factors (age, gender, marital status, highest level of education, employment status, and annual household income) in our analysis. These factors are often associated with basic variations in health (Chandola, 2000; Rose & Pevalin, 2000). Current annual household income is constructed from information on the annual labour and non-labour income of each member of the household. To allow for the effects of household size and composition, household income is equivalised using the McClements scale (see Taylor et al., 1998). It is also deflated to 2005 prices using

the retail price index and is transformed to natural logarithms to allow for concavity of the relationship between health outcomes and income. We allow for a flexible relationship between health outcomes and age by specifying a cubic polynomial in age (i.e. AGE, AGE^2 and AGE^3). A vector of time dummies is included to capture aggregate health shocks and any effects of age that are not captured by the polynomial. We also include indicators for region of residence in our models but the parameter estimates are not reported as geographical variation is not the focus of this paper and the categories used in these variables are rather cruder. Our structural variables are defined in Table 2 following:

Table 2: Structural Variable Definitions

CMI	*1 if GHQ >=4, 0 otherwise*
PHL	*1 if poor and very poor self-rated physical health, 0 otherwise*
AGE	*Age in years at 1st December of current wave*
FEMALE	*1 if female, 0 otherwise (reference group)*
MALE	*1 if male, 0 otherwise*
MARRIED	*1 if married or living as a couple, 0 otherwise (reference group)*
SEPERATED	*1 if divorced or separated, 0 otherwise*
WIDOW	*1 if widowed, 0 otherwise*
NVMARRIED	*1 if never married, 0 otherwise*
NOQUA	*1 if no qualification, 0 otherwise (reference group)*
QUA	*1 if qualification, 0 otherwise*
HIQUA	*1 if higher degree, 0 otherwise*
PAID_EMP	*1 if in paid employed, 0 otherwise (reference group)*
SELF_EMP	*1 if self employed, 0 otherwise*
UNEMP	*1 if unemployed, 0 otherwise*
RETIRED	*1 if retired, 0 otherwise*
STUDENT	*1 if full-time student, 0 otherwise*
OTHER_EMP	*1 if other employment status, 0 otherwise*
LOGINC	*Natural log of equivalised annual real household income in pounds*

Descriptive statistics for all of the variables used in our analysis for the full sample broken down by health status are set out in Table 3. Stratifying the sample by 'healthy' and 'unhealthy' reveals that mentally healthy individuals tend to be associated with higher indicators of social capital, to be older, more likely to be male, married, employed, retired, and to have a higher real household income, and to be less likely to

be divorced/separated or unemployed than their mentally unhealthy counterparts. Comparably, individuals are more likely to be physically healthy if they are younger, male, employed and if they have higher academic qualifications and higher household income.

Table 3: Variable Means by Health Indicators

	Mental Health		*Physical Health*	
	Healthy	*Unhealthy*	*Healthy*	*Unhealthy*
	N = 37851	*N = 8984*	*N = 46978*	*N = 3869*
SOCIAL PARTICIPATION	1.204	1.187	1.214	0.970
FRIEND CONTACT	8.344	8.290	8.313	8.379
LOW SOCIAL SUPPORT	0.353	0.409	0.354	0.479
AGE	47.06	45.84	47.11	50.65
FEMALE	0.566	0.671	0.579	0.661
MALE	0.434	0.329	0.421	0.339
MARRIED	0.701	0.644	0.690	0.657
SEPERATED	0.094	0.151	0.099	0.165
WIDOW	0.047	0.048	0.051	0.064
NVMARRIED	0.157	0.156	0.160	0.114
NOQUA	0.175	0.182	0.178	0.316
QUA	0.408	0.393	0.397	0.386
HIQUA	0.414	0.422	0.421	0.295
PAID_EMP	0.602	0.553	0.602	0.341
SELF_EMP	0.085	0.072	0.084	0.045
UNEMP	0.019	0.039	0.022	0.030
RETIRED	0.175	0.143	0.177	0.250
STUDENT	0.010	0.011	0.010	0.012
OTHER_EMP	0.010	0.013	0.010	0.009
LOGINC	10.148	10.085	10.146	9.855

Note: Mentally Health - Unhealthy if CMI = 1 /Healthy if CMI = 0; Physical Health - Unhealthy if PHL = 1 / Healthy if PHL = 0

Our focus in what follows is the relationship between changes in health outcomes and temporally prior conditions of our social capital and structural measures. The correlations in health outcomes across our 17 waves of data show a clear pattern - see Tables 4a and 4b. As one might expect, waves closer together have generally higher correlations than waves further apart. The off-diagonal correlations vary between 0.417 and 0.161 for mental health, and 0.504 and 0.182 for physical health. These correlations.

Table 4a: Correlation Matrices

CMI = 1 (Mentally Unhealthy)

Wave	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
1	1																
2	0.294	1															
3	0.269	0.294	1														
4	0.229	0.243	0.323	1													
5	0.209	0.240	0.264	0.306	1												
6	0.234	0.203	0.230	0.301	0.298	1											
7	0.183	0.154	0.173	0.229	0.266	0.312	1										
8	0.202	0.169	0.197	0.209	0.228	0.302	0.371	1									
9	0.197	0.206	0.192	0.183	0.226	0.272	0.304	0.331	1								
10	0.201	0.220	0.218	0.198	0.212	0.267	0.254	0.300	0.330	1							
11	0.228	0.167	0.188	0.185	0.210	0.218	0.208	0.259	0.311	0.335	1						
12	0.175	0.169	0.175	0.174	0.198	0.206	0.190	0.242	0.285	0.305	0.320	1					
13	0.174	0.183	0.172	0.177	0.205	0.222	0.230	0.243	0.241	0.276	0.274	0.323	1				
14	0.158	0.180	0.161	0.186	0.202	0.214	0.239	0.278	0.284	0.259	0.254	0.299	0.337	1			
15	0.191	0.161	0.185	0.170	0.223	0.220	0.215	0.249	0.274	0.288	0.289	0.320	0.340	0.386	1		
16	0.195	0.183	0.195	0.204	0.198	0.233	0.169	0.193	0.263	0.239	0.207	0.266	0.285	0.301	0.407	1	
17	0.191	0.181	0.165	0.162	0.180	0.214	0.208	0.226	0.227	0.261	0.212	0.263	0.251	0.302	0.317	0.417	1

Table 4b: Correlation Matrices

PHL = 1 (Physically Unhealthy)

Wave	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
1	1																
2	0.414	1															
3	0.315	0.361	1														
4	0.278	0.308	0.383	1													
5	0.243	0.243	0.344	0.432	1												
6	0.237	0.243	0.313	0.339	0.379	1											
7	0.258	0.245	0.302	0.315	0.326	0.366	1										
8	0.227	0.232	0.299	0.330	0.333	0.305	0.435	1									
9	0.235	0.251	0.254	0.279	0.288	0.288	0.318	0.377	1								
10	0.270	0.266	0.289	0.296	0.289	0.283	0.325	0.375	0.364	1							
11	0.226	0.263	0.291	0.292	0.285	0.307	0.360	0.333	0.316	0.454	1						
12	0.239	0.239	0.256	0.273	0.276	0.276	0.304	0.298	0.314	0.382	0.471	1					
13	0.247	0.259	0.249	0.266	0.276	0.308	0.281	0.326	0.347	0.356	0.439	0.458	1				
14	0.221	0.234	0.250	0.262	0.266	0.276	0.301	0.324	0.306	0.377	0.443	0.456	0.483	1			
15	0.206	0.241	0.230	0.269	0.294	0.262	0.252	0.287	0.315	0.327	0.398	0.353	0.435	0.447	1		
16	0.231	0.217	0.254	0.287	0.264	0.259	0.287	0.334	0.323	0.388	0.430	0.390	0.396	0.418	0.504	1	
17	0.182	0.190	0.240	0.277	0.284	0.255	0.297	0.337	0.338	0.358	0.367	0.382	0.371	0.409	0.438	0.504	1

suggest that although health outcomes are more similar the closer the reporting period, there exists considerable mobility in these two health indicators over time. Also, the non-zero correlation at the extremes suggests that this mobility operates around some underlying persistence in individual health trajectories

3. Models and Estimation Methods

To model dynamics in the health indicators, we specify random effects variance component models on our balanced panel of data. We also include the previous period's health status in our empirical model (Model 2) in order to estimate directly the impact of previous health state on current health outcomes (Contoyannis et al., 2004). The latent variable specification of the model that we estimate can be written as:

$$y_{it}^{*} = \mathbf{X}_{it}\mathbf{B} + \gamma y_{it-1} + \alpha_i + \varepsilon_{it} \quad (1)$$

where $i = 1, 2 \ldots, N$ and $t = 2, 3, \ldots, 17$. y_{it} is the set of observed variables that may be associated with the health indicators. To capture state dependence, y_{it-1} is an indicator of the individual's health state in the previous wave. The total error is composed of a_i, an individual-specific and time-invariant random component and e_{it}, the usual idiosyncratic error component.

To allow for the possibility that the observed covariates may be correlated with the individual effect, we parameterise the distribution of the individual-specific effect by using Wooldridge's approach (Wooldridge, 2005):

$$\alpha_i = \alpha_0 + \alpha_1 y_{i1} + \alpha_2 \bar{\mathbf{X}}_i + \mu_i \quad (2)$$

where $\bar{\mathbf{X}}_i$ is the average over the sample period of the observations on the exogenous variables, μ_i is assumed to be distributed $\mu_i \sim N\left(0,\sigma_\mu^2\right)$ and independent of the $\mathbf{X}$ variables, the initial conditions, and the idiosyncratic error term ε_{it}.

Substituting (2) into (1) yields a model that has a random effects structure with the covariates at time *t* augmented to include the initial value y_{i1} and $\bar{\mathbf{X}}_i$. This results in a likelihood function based on the joint distribution of the observations conditional on initial health status. Estimates of α_1 are also of interest as they are informative about the relationship between the individual effect and initial health. It should be noted that all time dummies must be dropped from $\bar{\mathbf{X}}_i$ to avoid perfect colinearity.

In addition, we also present for comparison estimates based on a model (Model 1) that excludes the previous period's health status. The intra-unit correlation coefficient, ρ, represents the correlation of health outcomes across periods of observation. A relatively large value implies that individuals experience relatively high persistence and low mobility in health outcomes, and vice versa.

4. Results

Table 5 presents coefficient estimates for the variance components maximum likelihood estimation. The Hausman test for fixed versus random effects specification fails to reject the null hypothesis of no correlation between the time-varying covariates and the unobserved individual effect once the individual effect has been parameterised using the within-individual means of the covariates - CMI: $\chi^2_{21} = 134.26 \ \left(p < 0.001\right)$; PHL: $\chi^2_{21} = 271.69 \ \left(p < 0.001\right)$. A RESET test of misspecification applied to the models

suggests that for both CMI and PHL, our model is the better specified - CMI: $c_{21}^2 = 0.67 \ \left(p = 0.41\right)$, PHL: $c_{21}^2 = 0.43 \ = 0.51$

Table 5: Dynamic Random Effects Probit Model with/without Initial Condition

Dependent Variable = 1 if Respondent Mentally / Physically Unhealthy

	Mental Health				*Physical Health*			
	Model 1		*Model 2*		*Model 3*		*Model 4*	
	N=2755		*NT=44080*		*N=2991*		*NT=47856*	
	Coef.	*S.E.*	*Coef.*	*S.E.*	*Coef.*	*S.E.*	*Coef.*	*S.E.*
Y_{t-1}	-	-	0.444	0.020	-	-	0.643	0.032
SOCIAL PARTICIPATION (SP)	0.010	0.011	0.010	0.011	-0.022	0.016	-0.016	0.016
FRIEND CONTACT (FC)	-0.001	0.005	0.000	0.005	-0.013	0.006	-0.006	0.006
LOW SOCIAL SUPPORT (LSS)	0.122	0.026	0.036	0.018	0.063	0.035	0.223	0.024
PERMANENT SP	0.040	0.022	0.022	0.020	-0.049	0.032	-0.051	0.028
PERMANENT FC	-0.031	0.013	-0.023	0.011	0.054	0.019	0.035	0.016
PERMANENT LSS	0.810	0.102	0.612	0.084	0.901	0.143	0.432	0.112
AGE	0.079	0.016	0.074	0.016	-0.014	0.022	0.020	0.022
AGE2	-0.183	0.032	-0.167	0.033	0.012	0.044	-0.042	0.044
AGE3	0.012	0.002	0.011	0.002	0.001	0.003	0.004	0.003
MALE	-0.400	0.038	-0.304	0.032	-0.181	0.055	-0.105	0.044
SEPERATED	0.209	0.036	0.175	0.035	0.156	0.052	0.134	0.049
WIDOW	0.288	0.062	0.191	0.059	-0.135	0.080	-0.064	0.073
NVMARRIED	0.071	0.041	0.051	0.038	-0.033	0.062	-0.003	0.056
QUA	0.005	0.047	-0.005	0.042	-0.250	0.063	-0.143	0.053
HIQUA	0.003	0.049	0.017	0.042	-0.320	0.065	-0.153	0.054
SELF_EMP	-0.096	0.040	-0.075	0.040	-0.255	0.065	-0.225	0.062
UNEMP	0.507	0.050	0.442	0.052	0.026	0.071	-0.020	0.072
RETIRED	-0.054	0.041	-0.062	0.041	-0.054	0.050	-0.047	0.049
STUDENT	-0.119	0.080	-0.117	0.086	0.010	0.117	-0.393	0.159
OTHER_EMP	0.142	0.075	0.134	0.116	-0.023	0.120	0.164	0.186
LOGINC	-0.026	0.015	-0.013	0.014	-0.095	0.019	-0.089	0.019
Y_1 *(Initial Condition)*	-	-	0.666	0.038	-	-	1.190	0.078
s_n	-0.410	0.042	-0.919	0.050	0.186	0.053	-0.443	0.063
s_e	0.815	0.017	0.632	0.016	1.098	0.029	0.801	0.025
r	0.399	0.010	0.285	0.010	0.546	0.013	0.391	0.015
Log Likelihood		-19396		-17932		-10030		-9422

Notes: Time dummies and geographic covariates have been suppressed from results.

Considering Model 1 in Table 5, it is apparent that males generally present better health, both mental and physical, than females. Compared to the baseline category of married/cohabiting, individuals who were separated/divorced exhibited worse mental and physical health, whilst widowed respondents exhibited worse mental health only.

There is some indication that higher academic qualifications are associated with better physical health (as compared to the baseline of respondents with no qualifications). Few of the employment status categories are significant. The self-employed and students are associated with better physical health, and the unemployed report relatively poor mental health. Higher household income is associated with better physical health.

There was some indication that contemporaneous and permanent social participation are positively (negatively) related to mental (physical) health although these effects are not significant. Whilst the contemporaneous friend contact indicator is insignificant, a positive (negative) association is found between the permanent friend contact indicator and mental (physical) health. Both contemporaneous and permanent social support is positively associated with mental and physical health. It is notable that once initial and lagged health statuses are included in the model, the effect of permanent social capital indicators diminishes substantially. Further, the effect of the contemporaneous friend contact indicator on physical health and the effect of permanent social participation on mental health become insignificant. This suggests that conditioning on initial period health removes the contemporaneous friend contact effect and the permanent social participation effect. Interestingly, permanent social capital indicators generally dominated contemporaneous social capital effects.

Allowing for individual heterogeneity is clearly important in our variance components model. Approximately 40% of the unobserved variability in mental health is accounted for by individual heterogeneity whilst for physical health the figure is almost 55%. Although both of these figures are significantly different to zero, their magnitudes suggests that persistencies in mental health are relatively modest and that time-varying random fluctuations dominate whereas for physical health it is individual effects that dominate. In other words, mobility in mental health is greater than in physical health.

Model 2 in Table 5 sets out estimates for the lagged dependent variable in a dynamic model. The estimates are larger for both mental and physical health than those reported in Model 1 due to the positive correlation between the lagged dependent variable and unobserved heterogeneity. For mental health, the coefficient is 0.44 while for physical health the coefficient is 0.64. Although both coefirivnts are highly significant, their absolute values are a long way from the complete persistence coefficient of unity. Further, the coefficient for mental health is smaller than the estimated effect for permanent social support. The proportion of variance attributable to an unobserved individual effect is 28% for mental health and 39% for physical health. This is a 30% reduction for mental health, and a 29% reduction for physical health, from the estimates obtained from Model 1. Interestingly, the coefficient estimates of initial period health status are larger than their respective state dependence estimates (0.67 for mental health and 1.19 for physical health). This suggests that initial health status has a greater bearing on subsequent health outcomes than does health status in the previous period. These results suggest substantial mobility across time around an underlying level of health status.

5. Final Comments

Given that social capital plays an important and growing role in UK health policy, it is vital that health enhancing intervention programs are targeted towards those population groups most in need. In most studies, these groups have been identified via cross-sectional analyses that cannot exclude the possibility of reverse causality. Cross-section data provides only a snap-shot of the distribution of health status at a particular point in time and renders population intervention less cost-effective in terms of identifying at-risk groups. Our aim in this paper has been to shed further light on systematic

differences in the persistence of health problems using UK panel data, thereby aiding the development of more effective public health policies in the UK.

Our econometric analysis applied models both with and without previous dependent health status to investigate the links between perceived mental and physical health and social capital using data from the first seventeen annual waves of the British Household Panel Survey. Model 1 divided unobserved variability in health outcomes into transitory and permanent components and used the proportion of total variability attributed to the permanent component as a measure of health mobility. The smaller this proportion, the higher is health mobility. In Model 2, the degree of health mobility was measured by the estimated coefficient on previous period's health status included as an additional covariate. The smaller the coefficient, the higher is health mobility.

Our longitudinal analyses suggests that whilst there is substantial mobility in both mental and physical health, the former exhibits higher fluctuations over time than the latter. There are also systematic differences in mobility across socio-economic groups. In general, gender, marital status, employment status and household income are significantly related to changes in both mental and physical health. Mental health deteriorates at a decreasing rate with age whilst higher academic qualifications are associated with better physical, but not mental, health outcomes. It may be that education directly affects physical activity lifestyle choices or it may influence these indirectly through lower socioeconomic status and poorer access to amenities.

Our analysis also explored the role of social capital in determining individuals' health outcomes. Our results suggest that the effects of short-term social capital measures on the probability of an onset of and recovery from both mental and physical health are minimal. Only social support reduces the probability of a recovery from mental or physical illness. Both long-term friend contact and social support effects are

important determinants of mental and physical health whilst long-term social capital effects generally dominate short-term contemporaneous effects. Including state dependence improves the fit of our model and reduces the impact of individual unobserved heterogeneity. Conditioning on state dependence and initial health status reduces the contribution of unobserved permanent heterogeneity from approximately 40% of the total unexplained variation to approximately 28% for mental health, and from 55% to 39% for physical health.

References

Bain, K., & Hicks, N. (1998). Building social capital and reaching out to excluded groups: the challenge of partnerships. CELAM meeting on the struggle against poverty towards the turn of the millennium. Washington DC.

Bierman, A.S., Bubolz, T.A., Fisher, E.S., & Wasson, J.H. (1999). How well does a single question about health predict the financial health of Medicare managed care plans? *Effective Clinical Practice*, 2, 7.

Booth, M.L., Owen, N., Bauman, A., Clavisi, O., & Leslie, E. (2000). Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Preventive Medicine*, 31, 15-22.

Bowling, A. (1991). *Measuring health: a review of quality of life measurement scales*. Milton Keynes: Open University Press.

Brisson, D., & Usher, C.L. (2007). The Effects of Informal Neighborhood Bonding Social Capital and Neighborhood Context on Homeownership for Families Living in Poverty. *Journal of Urban Affairs*, 29, 65-75.

Chandola, T. (2000). Social class differences in mortality using the National Statistics Socio-economic Classification: a reply to Rose and Pevalin. *Social Science & Medicine*, 51, 1129-1133.

Contoyannis, P., Jones, A.M., & Rice, N. (2004). The dynamics of health in the british household panel survey. *Journal of Applied Econometrics*, 19, 473-503.

Cooper, H., Arber, S., Fee, L., & Ginn, J. (1999). The influence of social support and social capital on health: a review and analysis of British data. London: Health Education Authority.

Coulthard, M., Walker, A., & Morgan, A. (2001). Assessing people's perceptions of their neighbourhood and community involvement (Part 1). London: Health Development Agency.

Davies, A.R., & E., W.J.J. (1981). Measuring health perceptions in the Health Insurance Experiment. Santa Monica, CA: The Rand Corporation.

De Silva, M.J., McKenzie, K., Harpham, T., & Huttly, S.R. (2005). Social capital and mental illness: a systematic review. *J Epidemiol Community Health*, 59, 619-627.

Department of Health (2001). Making it happen a guide to mental health promotion. London.

Department of Health (2006). Health Challenge England - next steps for Choosing Health. London.

Department of Health (2010). Future of Social Work in Adult Social Services in England. London.

Derose, K.P. (2008). Do Bonding, Bridging, and Linking Social Capital Affect Preventable Hospitalizations? *Health Services Research*, 43, 1520-1541.

Drukker, M., Kaplan, C., Feron, F., & van Os, J. (2003). Children's health-related quality of life, neighbourhood socio-economic deprivation and social capital. A contextual analysis. *Social Science & Medicine*, 57, 825-841.

Fylkesnes, K., & Forde, O.H. (1991). The Tromso Study - Predictors of Self-Evaluated Health - Has Society Adopted the Expanded Health Concept. *Social Science & Medicine*, 32, 141-146.

Giles-Corti, B., & Donovan, R.J. (2002). The relative influence of individual, social and physical environment determinants of physical activity. *Social Science and Medicine*, 54, 1793-1812.

Goldberg, D.P., Oldehinkel, T., & Ormel, J. (1998). Why GHQ threshold varies from one place to another. *Psychological Medicine*, 28, 915-921.

Goldberg, D.P., & Williams, P. (1988). A user's guide to the General Health Questionnaire. Windsor.

Greiner, K.A., Li, C., Kawachi, I., Hunt, D.C., & Ahluwalia, J.S. (2004). The relationships of social participation and community ratings to health and health behaviors in areas with high and low population density. *Social Science and Medicine*, 59, 2303-2312.

Henderson, S., & Whiteford, H. (2003). Social capital and mental health. *Lancet*, 362, 505-506.

Kawachi, I., Colditz, G.A., Ascherio, A., Rimm, E.B., Giovannucci, E., Stampfer, M.J., et al. (1996). A prospective study of social networks in relation to total mortality and cardiovascular disease in men in the USA. *Journal of Epidemiology and Community Health,* 50, 245-251.

Leyden, K.M. (2003). Social capital and the built environment: The importance of walkable neighborhoods. *American Journal of Public Health,* 93, 1546-1551.

Lindstrom, M., Hanson, B.S., & Ostergren, P.O. (2001). Socioeconomic differences in leisure-time physical activity: the role of social participation and social capital in shaping health related behaviour. *Soc Sci Med,* 52, 441-451.

Lindstrom, M., Merlo, J., & Ostergren, P.O. (2002). Individual and neighbourhood determinants of social participation and social capital: a multilevel analysis of the city of Malmo, Sweden. *Soc Sci Med,* 54, 1779-1791.

Lowndes, V. (2004). Getting On or Getting By? Women, Social Capital and Political Participation. *The British Journal of Politics & International Relations,* 6, 45-64.

Morrow, V. (1999). Conceptualising social capital in relation to the well-being of children and young people: a critical review. *Sociological Review,* 47, 744-765.

Mossey, J.M., & Shapiro, E. (1982). Self-Rated Health - a Predictor of Mortality among the Elderly. *American Journal of Public Health,* 72, 800-808.

Nakhaie, R., & Arnold, R. (2010). A four year (1996-2000) analysis of social capital and health status of Canadians: The difference that love makes. *Social Science & Medicine,* 71, 1037-1044.

Orthgomer, K., Rosengren, A., & Wilhelmsen, L. (1993). Lack of Social Support and Incidence of Coronary Heart-Disease in Middle-Aged Swedish Men. *Psychosomatic Medicine,* 55, 37-43.

Pevalin, D.J. (2000). Multiple applications of the GHQ-12 in a general population sample: an investigation of long-term retest effects. *Social Psychiatry and Psychiatric Epidemiology,* 35, 508-512.

Pevalin, D.J., & Rose, D. (2002). Social capital for health. Investigating the links between social capital and health using the British Household Panel Survey. London Health Development Agency.

Rose, D., & Pevalin, D.J. (2000). Social class differences in mortality using the National Statistics Socio-economic Classification - too little, too soon: a reply to Chandola. *Social Science & Medicine,* 51, 1121-1127.

Taylor, M.F., Brice, J., Prentice-Lane, N.B., & Prentice-Lane, E. (1998). British Household Panel Survey: User Manual. Colchester: University of Essex.

Welin, L., Larsson, B., Svardsudd, K., Tibblin, B., & Tibblin, G. (1992). Social Network and Activities in Relation to Mortality from Cardiovascular-Diseases, Cancer and Other Causes - a 12 Year Follow-up of the Study of Men Born in 1913 and 1923. *Journal of Epidemiology and Community Health,* 46, 127-132.

Wooldridge, J.M. (2005). Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics,* 20, 39-54.